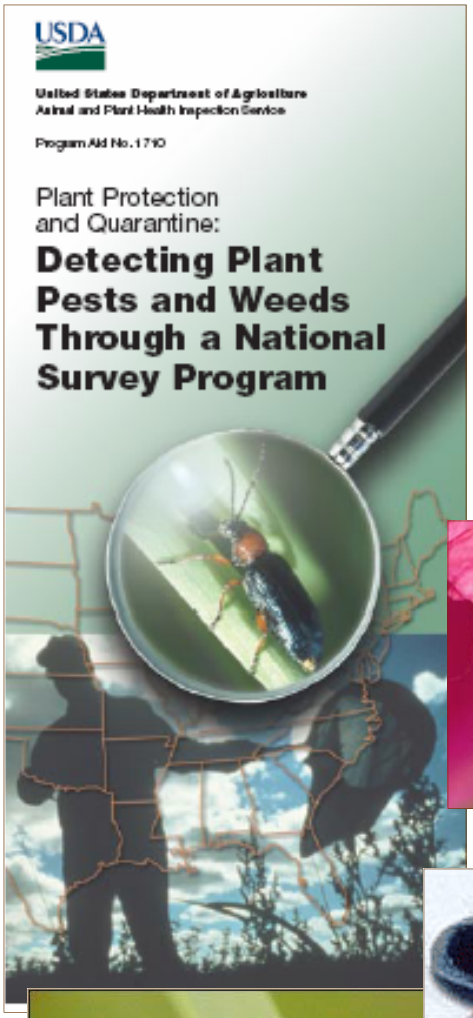
Montana Department of Agriculture Cooperative Agricultural Pest Survey 2003 Report



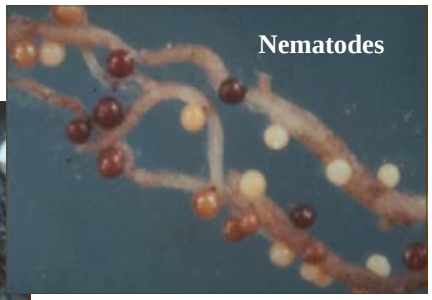

Japanese Beetle

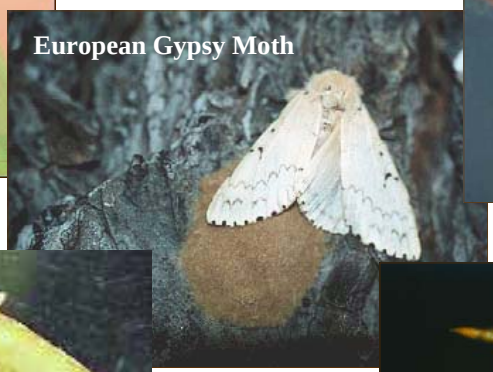

Karnal Bunt


Barberry


Cereal Leaf Beetle


Cereal Leaf Beetle Biological Control


Nematodes


European Gypsy Moth


Potato Mop Top Virus


European Pine Shoot Moth

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2003 Surveys

European Gypsy Moth
Karnal Bunt
Japanese Beetle
European Pine Shoot Moth

Black Stem Rust
Cereal Leaf Beetle
Cereal Leaf Beetle Biological Control
Nematodes
Potato Mop Top Virus

This report was compiled by Patricia Denke, Kimberly Merenz, and Lori Witham

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Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program

Gypsy Moth Survey Report
2003

Gypsy Moth Larval Stages

The European gypsy moth (*Lymantria dispar*) is a pest of deciduous trees, particularly oak and aspen, due to larval feeding on the leaves. During severe outbreaks, total defoliation can occur, and trees can be severely weakened. Subsequent additional hardships to the trees, due to weather or additional insect or disease pressure can then lead to death.

Gypsy moth movement from infested areas is generally through transport of egg masses, laid on various objects, including such items as trailers, the undersides of cars, firewood and nursery stock.

First Instar Caterpillars

The gypsy moth survey in Montana is a coordinated effort between the, the USDA APHIS Plant Protection and Quarantine, the Montana Department of Natural Resources & Conservation, the USDA Forest Service and the Montana Department of Agriculture. Statewide, 1,023 traps were placed in 50 counties. Trap numbers are as follows:

USDA APHIS PPQ	401
MT DNRC	50
USDA Forest Service	330
MT Dept. of Agriculture	242
TOTAL	**1043**

Although there are no known infestations of gypsy moth in Montana, there have been several detections through trapping or finds of egg masses on suspect carriers, over the years. As a result, Montana continues to require a strong monitoring program to prevent introduction, and to direct control efforts to eliminate accidental introductions.

Adult Male

Adult Female

While the Montana Department of Agriculture trapping efforts did not detect any Gypsy moths, the USDA APHIS PPQ did find a single adult specimen in Glacier County near Browning. The moth was positively identified by PPQ. This is similar to the situation in past years, when isolated specimens have been collected in various counties throughout the state (Figure 1). Trapping efforts near the find will intensify in 2004.

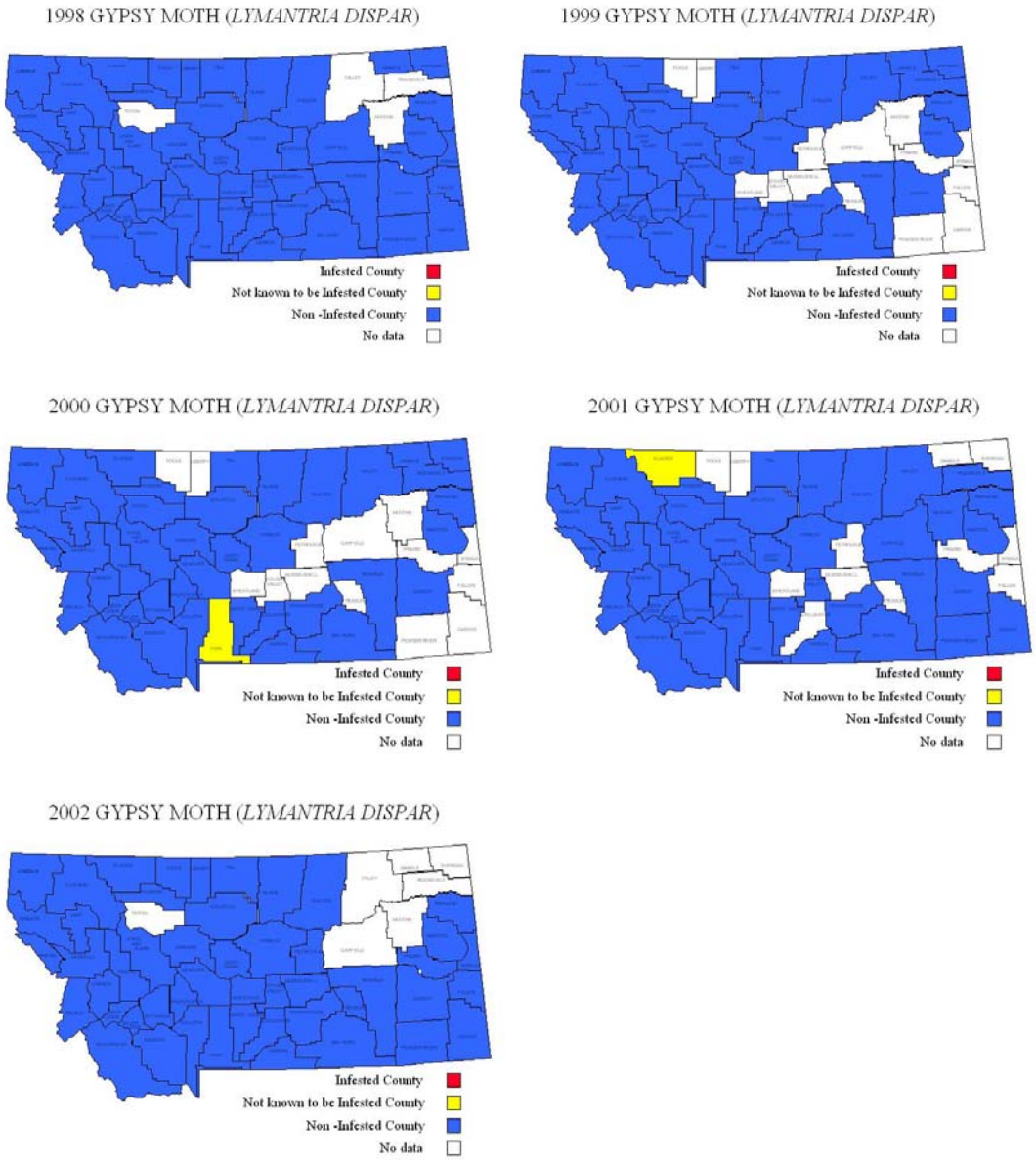
In 2004 the Montana Department of Agriculture will also revitalizing the Montana Gypsy Moth Working Group. This group includes the MDA, APHIS PPQ, Forest Service and the MT Department of Natural Resources and Conservation. These members are signatories to an Interagency Contingency Plan for action against gypsy moth in Montana.

Montana Department of Agriculture Trapping Numbers

County	Number of Traps	Result
Flathead	59	Negative
Glacier	4	Negative
Lake	7	Negative
Lewis & Clark	62	Negative
Lincoln	35	Negative
Missoula	23	Negative
Powell	25	Negative
Ravalli	27	Negative
Total	**242**	

All photos courtesy of the USDA Forest Service.

Figure 1. Distribution of Gypsy moth catches throughout Montana.



Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

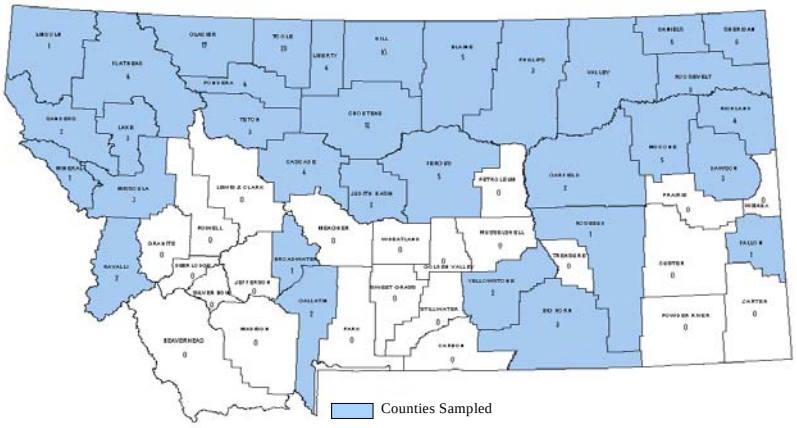
Karnal Bunt Survey Report
2003

Karnal bunt is a fungal disease of wheat and triticale that is caused by the fungus *Tilletia indica.* This disease is influenced by weather and climatic conditions. The most severe infections occur when there is cool, wet weather when the wheat is heading out. Montana has participated in the national survey since 1996.

Karnal bunt is not known to occur in Montana and our participation in the national survey is necessary to confirm that production areas in Montana are free of Karnal bunt. Karnal bunt is considered a priority pest nationwide and is identified on the CAPS Western Region Pest List.

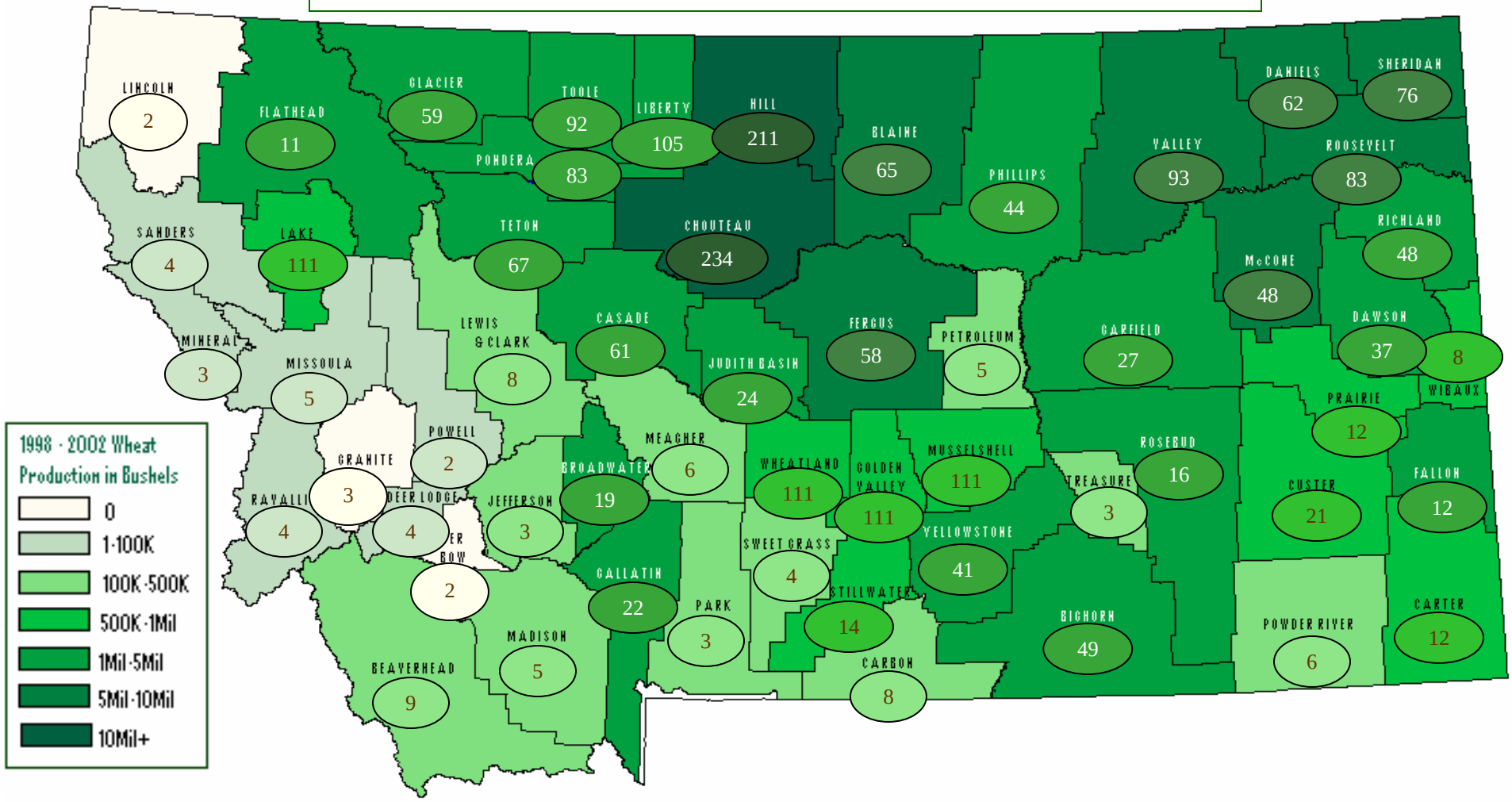
Montana's wheat industry is a valuable component of Montana agriculture. In 2002 Montana produced over 135 million bushels of wheat, ranking 5th in the nation. Wheat and wheat products are Montana's leading exports, making up 69% of the state's agricultural exports. Our participation in this survey has provided invaluable information in the form of negative analyses to support the export of Montana wheat to foreign markets.

2003 Montana Karnal Bunt Survey



Wheat samples were collected by the Montana Department of Agriculture during July and August 2003. A total of 112 samples for 33 counties were collected. Samples ranged from one per county to twelve in the largest wheat-producing county. Samples were processed and analyzed by USDA APHIS PPQ in Olney, Texas. All test results were negative for Karnal bunt. Survey results were entered into NAPIS by Jim Pheasant (USDA APHIS PPQ).

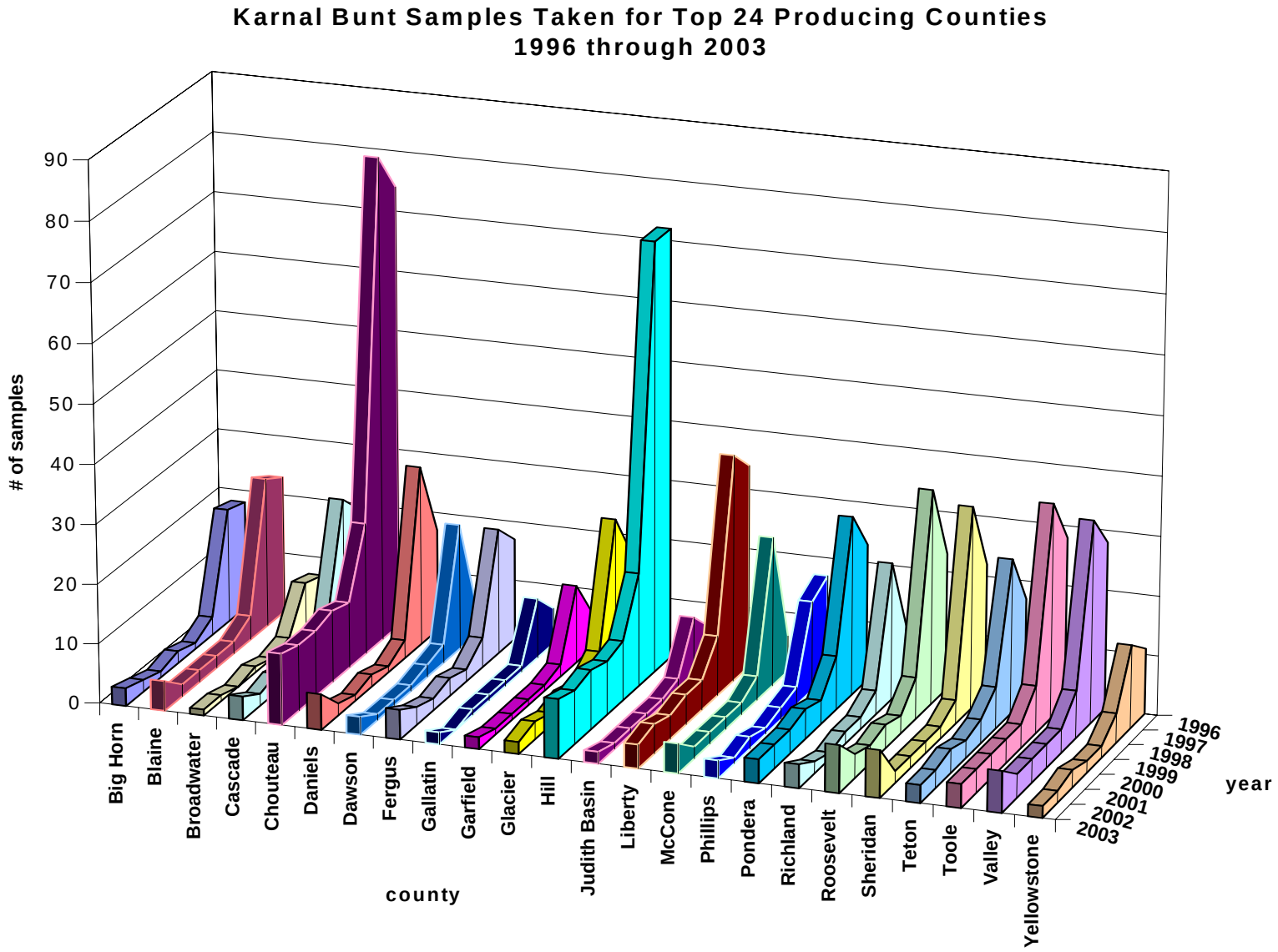
Average Number of Karnal Bunt Samples per County, 1996 - 2003
Compared to Average Wheat Production, 1998 - 2002



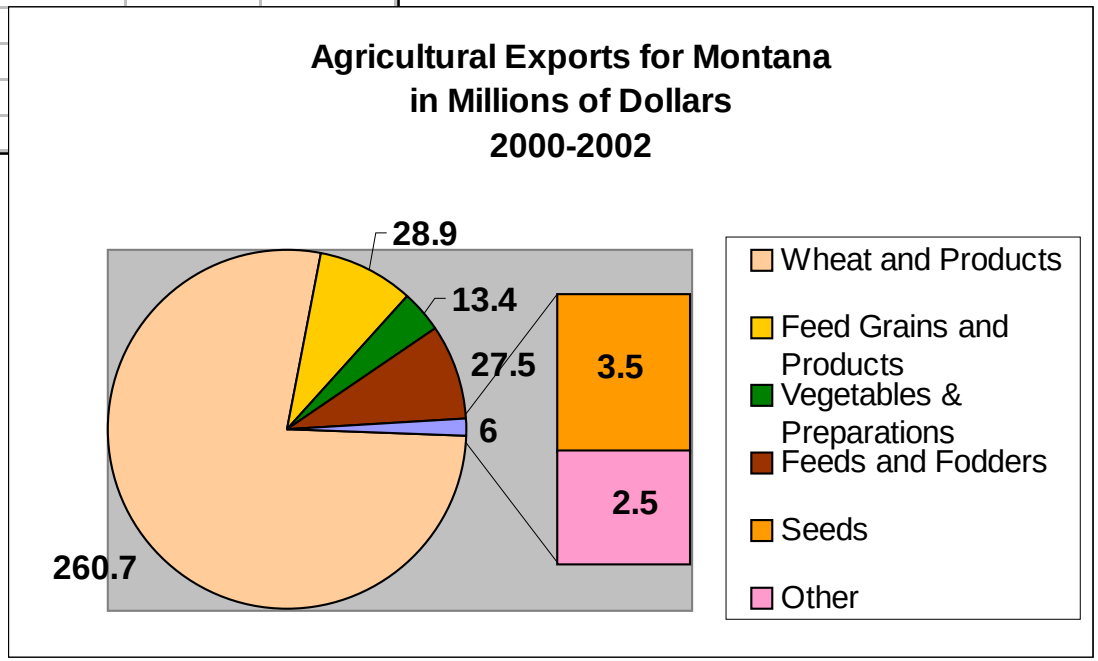
Karnal Bunt Samples - 1996 through 2003

County	1996	1997	1998	1999	2000	2001	2002	2003	Total # Samples	Avg. 5 Yr. Production, bu
Lincoln	0	1	0	0	0	0	1	0	2	0
Silver Bow	1	1	0	0	0	0	0	0	2	0
Granite	0	1	0	0	1	0	1	0	3	0
Deer Lodge	1	1	0	0	1	0	1	0	4	6,600
Powell	1	1	0	0	0	0	0	0	2	10,000
Mineral	1	1	0	0	0	0	1	0	3	41,800
Sanders	1	1	0	1	0	1	0	0	4	47,800
Ravalli	1	1	0	1	0	1	0	0	4	63,800
Missoula	1	1	1	1	0	1	0	0	5	91,800
Sweet Grass	1	1	0	1	0	1	0	0	4	114,400
Jefferson	1	1	0	0	0	0	1	0	3	138,400
Carbon	3	3	0	1	0	1	0	0	8	221,000
Park	1	2	0	0	0	0	0	0	3	239,800
Meagher	2	2	0	0	1	0	1	0	6	245,800
Treasure	1	2	0	0	0	0	0	0	3	263,800
Petroleum	1	3	0	0	0	1	0	0	5	318,400
Lewis & Clark	2	4	0	0	1	0	1	0	8	390,400
Madison	1	3	0	0	0	1	0	0	5	429,000
Powder River	2	4	0	0	0	0	0	0	6	452,800
Beaverhead	2	3	1	1	1	1	0	0	9	484,200
Golden Valley	3	5	1	0	1	0	1	0	11	570,400
Lake	3	5	1	0	1	0	1	0	11	629,800
Stillwater	4	7	1	1	0	1	0	0	14	633,400
Custer	3	5	4	2	3	2	2	0	21	658,200
Musselshell	3	5	1	1	0	1	0	0	11	683,800
Prairie	2	6	1	1	0	1	1	0	12	784,800
Carter	3	5	1	1	0	1	1	0	12	819,600
Wheatland	4	5	1	0	0	0	1	0	11	851,400
Wibaux	2	7	0	0	0	0	0	0	9	970,400
Fallon	2	7	0	1	0	1	0	1	12	1,151,000
Flathead	3	4	1	1	0	1	0	1	11	1,280,200
Rosebud	6	8	0	0	1	0	0	1	16	1,371,800
Broadwater	7	8	1	0	1	0	1	1	19	1,570,000

County	1996	1997	1998	1999	2000	2001	2002	2003	Total # Samples	Avg. 5 Yr. Production, bu
Yellowstone	11	14	5	2	2	3	2	2	41	2,028,400
Judith Basin	6	10	2	1	1	1	1	2	24	2,057,600
Garfield	6	13	2	1	1	1	1	2	27	2,162,400
Gallatin	6	10	1	1	1	1	0	2	22	2,386,000
Glacier	17	25	5	2	3	2	3	2	59	2,442,400
Big Horn	18	19	3	1	2	1	2	3	49	3,191,200
Dawson	5	21	3	2	1	1	1	3	37	3,455,480
Phillips	17	15	3	2	1	2	1	3	44	3,651,600
Teton	17	26	7	4	3	4	3	3	67	3,705,600
Cascade	19	23	5	3	2	3	2	4	61	4,071,400
Toole	28	36	8	4	4	4	4	4	92	4,153,800
Pondera	23	30	9	4	5	4	4	4	83	4,167,000
Liberty	34	38	10	5	5	4	5	4	105	4,382,800
Richland	10	23	4	2	2	1	2	4	48	4,520,600
Fergus	17	21	5	2	3	2	3	5	58	5,060,000
Blaine	23	25	4	2	2	2	2	5	65	5,328,800
McCone	6	25	4	2	2	2	2	5	48	5,435,000
Daniels	17	30	3	1	2	1	2	6	62	6,380,400
Valley	28	34	8	4	4	4	4	7	93	7,692,600
Sheridan	22	34	4	2	2	2	2	8	76	8,505,600
Roosevelt	23	36	7	3	4	3	4	8	88	8,655,400
Hill	72	72	19	10	9	10	9	10	211	10,677,200
Chouteau	74	81	22	11	12	11	11	12	234	12,497,400
TOTALS	568	775	158	85	85	85	85	112	1953	110,173,880


Karnal Bunt Samples Taken for Top 24 Producing Counties
1996 through 2003
# of samples
0
10
20
30
40
50
60
70
80
90
Big Horn
Blaine
Broadwater
Cascade
Chouteau
Daniels
Dawson
Fergus
Gallatin
Garfield
Glacier
Hill
Judith Basin
Liberty
McCone
Phillips
Pondera
Richland
Roosevelt
Sheridan
Teton
Toole
Valley
Yellowstone
county
1996
1997
1998
1999
2000
2001
2002
2003
year

Agricultural Exports for Montana and the United States						
Commodity	Montana			United States		
	2000	2001	2002	2000	2001	2002
	Million Dollars					
Wheat and Products	261	232	197	4,586.00	4,508.80	4,787.10
Feed Grains and Products	28.9	22.6	14.6	6,605.70	6,533.70	6,779.20
Vegetables & Preparations	13.4	12.5	14.1	4,440.40	4,511.20	4,551.00
Feeds and Fodders	27.5	20	22.2	1,859.80	2,143.70	1,951.20
Seeds	3.5	2.9	2.8	771.8	727.1	839.2
Other	2.5	2.7	2.9	17,609.60	18,586.30	19,314.60
All Commodities 2/	350	308	268	50,743.80	52,698.50	53,293.60
1/ Fiscal year ending September 30. 2/ Totals may not add due to rounding.						
SOURCE: Economic Research Service U.S. Agricultural Trade Update, June 2003						
Ag products	337	293	253			
% of total	96.2	95.1	94.6			
% ag products that are wheat	77.5	79.3	77.7			



Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program

Japanese Beetle Survey Report
2003

The Japanese Beetle (*Popillia japonica* Newman) is a pest of both nursery stock and field crops. It was first found in the United States in the early 1900's. The insect does its damage primarily as the immature, feeding on the roots of various turf grasses. Severe infestations can cause death of infested sod, resulting in bare spots. In fact, Japanese Beetle (JB) has been called the number 1 pest of sod in the United States. In infested areas, the sod frequently can be pulled up, revealing the white grubs under the soil at about the bottom of the root layer (figure 1). The adult beetles can also cause damage, feeding on the foliage of various plants, with a preference for roses. During 2003, some economic damage to soybean was associated with high JB populations in the mid-west.

As a result of the potential for JB to cause damage in a wide assortment of crops, USDA APHIS PPQ and various state agencies cooperate to regulate and monitor movement of the insect. Due to the insect being attracted to the scent of jet fuel, USDA APHIS PPQ regulates the movement of cargo planes by conducting inspections and treatment of planes, moving from areas known to be infested with JB. Under the U. S. Domestic Japanese Beetle Harmonization Plan, Montana has been classified as a Category 1 State, resulting in favored treatment with regard to the import nursery stock from infested areas.

Montana Department of Agriculture personnel have been engaged in trapping for detection of Japanese beetle since 1998. No beetles were detected until 2002, at which time 5 beetles, including a gravid female, were collected in pheromone traps in Billings, in the general area of the airport (Figure 2).

In early August 2003, 2 Japanese beetles were collected in Billings, again in the general area of the airport (Figure 3). Following these finds, in accordance with the U.S. Domestic Japanese Beetle Harmonization Plan, additional traps for JB were put out the in the Billings area by Montana Department of Agriculture and APHIS PPQ personnel (Figure 4).

Over 450 traps put out during the week of August 18, 2003 were checked again, with the traps in the inner square (#1) checked each week. Additionally, the south ½ of #2, all of 3-5, and the south ½ of #6 were

checked each week. The remaining traps were checked as frequently as resources would allow.

A single additional beetle, a female with abundant fat body, but no eggs, was found August 29, 2003 (Figure 3). Additional investigation revealed that Montana State University-Billings had recently placed new sod in the general area, so a larval survey was also performed on September 10, 2003. Although some white grubs were found, as well as some curculionid larvae, none were Japanese beetles. Identifications were done by Dr. Mike Ivie of Montana State University (Bozeman).

Because of the presence of Japanese beetles in traps this year, continued trapping at the current level (at least 450 traps in the general Billings area) will be necessary in 2004 to retain Montana's Category 1 status. In addition to the present locations (or locations near them), it is strongly recommended that nurseries receiving containerized, balled and burlapped, or any nursery stock with soil attached from Japanese beetle infested areas, be surveyed. Additional public education, of homeowners, nursery personnel, and others should also be regarded as essential.

2003Japanese Beetle trapping in Montana.

County/Location	Number of Traps	Result
Missoula	22	Negative
Gallatin	6	Negative
Lewis & Clark	6	Negative
Cascade	29	Negative
Flathead	20	Negative
Glacier	2	Negative
Lake	6	Negative
Lincoln	3	Negative
Ravalli	10	Negative
Sanders	6	Negative
Yellowstone	474	Positive - 3
Total	**584**	

Figure 1. Life stages of the Japanese beetle, Popillia japonica
Photos by USDA APHIS PPQ unless otherwise noted.

Larval Japanese Beetle, commonly called a white grub.

Adult Japanese beetle. Note white tufts on wing covers and coppery color.

Pupal Japanese beetle, found in the soil in a pupal cell..

Figure 2. Location of Japanese beetle finds in the Billings, MT area during 2002.

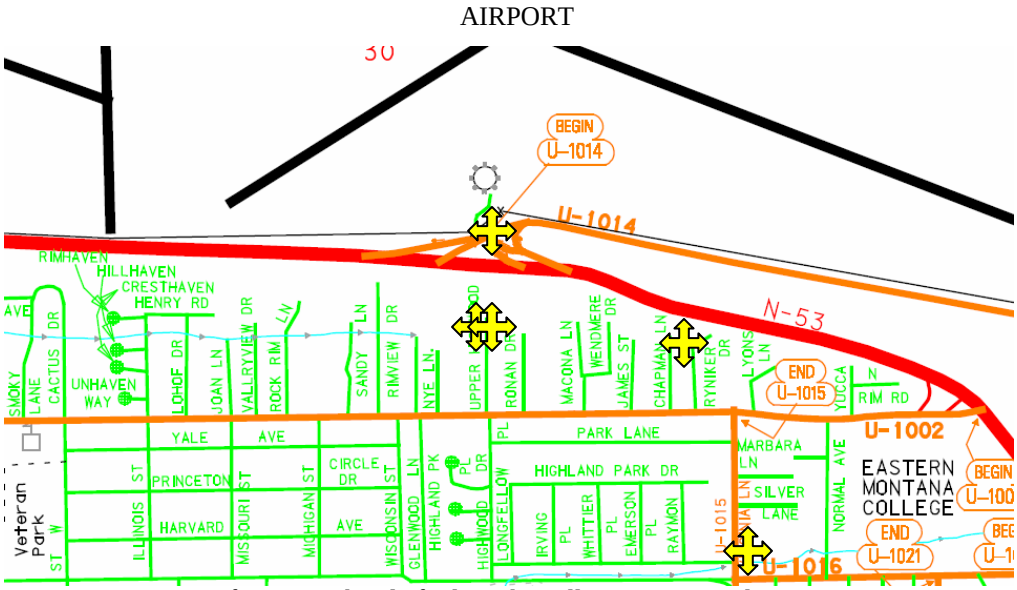


Figure 3. Location of Japanese beetle finds in the Billings, MT area during 2003.

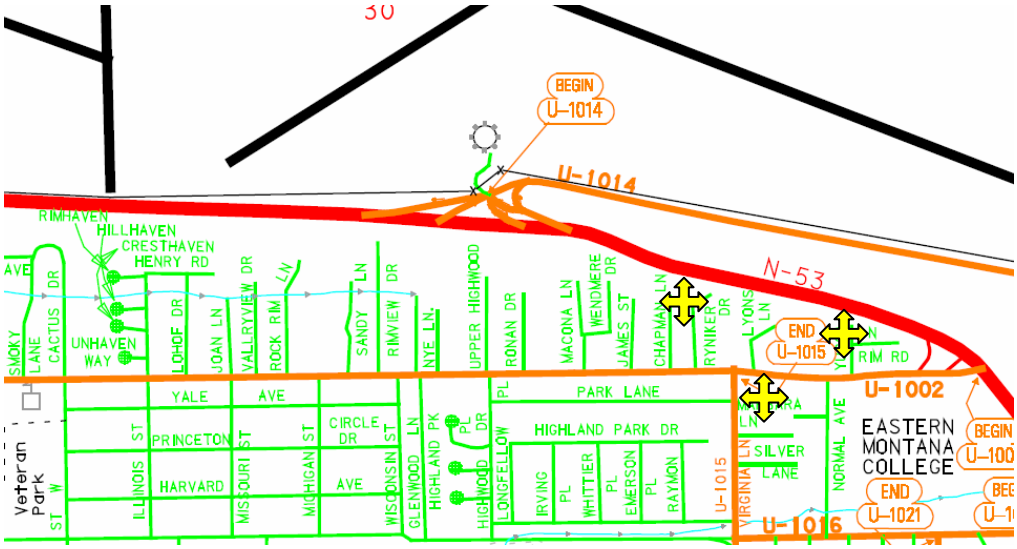


Figure 4. Installation of Japanese beetle traps in Billings, 18-22 Aug 2003.

Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

European Pine Shoot Moth Survey Report
2003

EPSM Adult
photo courtesy of Oregon Department of Agriculture

The European pine shoot moth (*Ryacionia bouliana* Denis & Schiffermuller) is a potential pest of nurseries and other timber related industries in Montana. The larvae of this moth feed on the needles of various pines, primarily of European origin, but also Ponderosa Pine, causing damage not only through their direct feeding but also due to changes in growth habit. The damage tends to result in a bushy growth. A majority of the host plants are grown in this region as Christmas trees or ornamental plantings, making shape and contour major considerations in their potential value.

Past surveys were carried out as a result of collections in Lake and Sanders Counties. In 2003 a total of 63 traps were placed, and no moths were found. An apparent egg mass with larval webbing was found in the Missoula area, and turned in to Montana State University Extension personnel for positive identification. It was identified as a pine shoot moth but not a European pine shoot moth by the MSU Insect Diagnostic Lab.

EPSM Damage
photo courtesy of Ohio State University

MDA District	Location	Number of Traps	Result
District A	Flathead County	3	negative
	Lincoln County	12	negative
	Missoula County	6	negative
	Mineral County	6	negative
	Ravalli County	5	negative
	Lake County	7	negative
	Sanders County	24	negative
District B	Not trapped	0	negative
District C	Not trapped	0	negative
District D	Not trapped	0	negative
District E	Not trapped	0	negative
Total Traps		**63**	

Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

Black Stem Rust Survey Report
2003

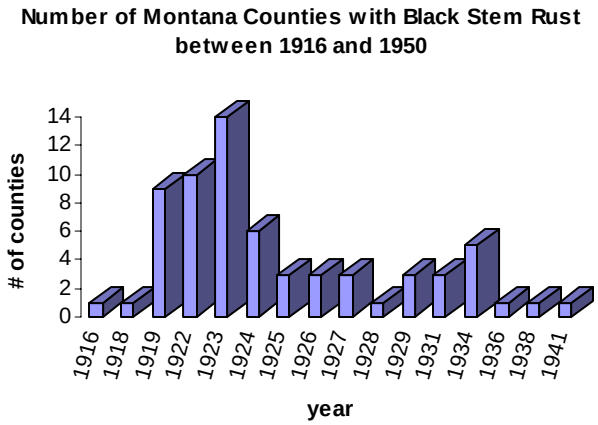
Black Stem Rust (BSR) is a destructive disease caused by *Puccinia graminis*, a fungus that reduces the quality and yield of infected cereal grains. The fungus lives on several species of *Berberis*, *Mahoberberis*, and *Mahonia*, and is spread by windborne spores. The life cycle of BSR is dependent on both cereal grains and susceptible barberry plants as alternate hosts. Montana regulates the movement of barberry plants sold in the nursery trade as landscaping material.

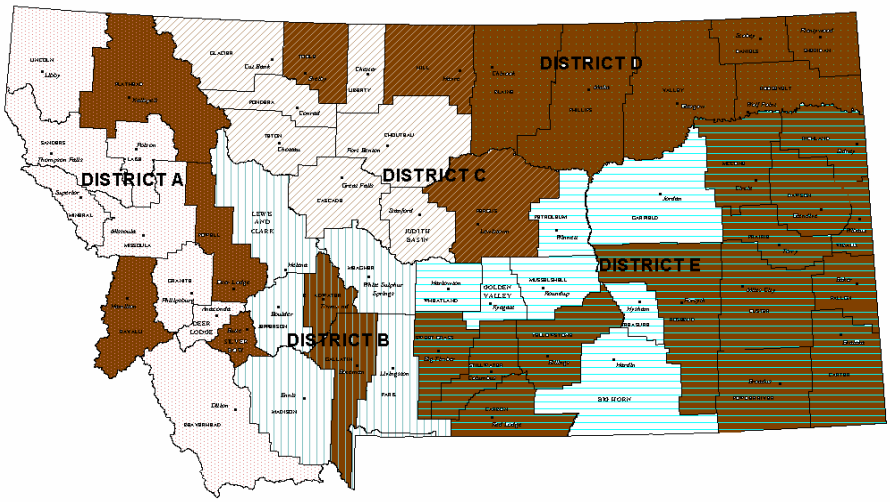
1937 Crew in Kalispell, MT

After two devastating rust epidemics in the U.S. in the early 1900's, the USDA began a barberry eradication program for important wheat producing states. These efforts concentrated on the removal of common barberry. This program continued into the 1970's when nearly all susceptible barberry plants had been destroyed. Eradication efforts in Montana ceased in 1975. The USDA withdrew the federal quarantine in 1981 and turned full responsibility over to the protected states. Until this year, there had been no survey activities for nearly 30 years in the wheat growing regions of Montana.

Black Stem Rust on wheat: photo courtesy of CIMMYT

According to the federal quarantine Montana is considered a protected state. A survey for wild barberry was conducted to ensure that BSR is not known to occur in Montana. This survey has provided current data and will allow small grain producers to certify that their crops are not at risk from contracting BSR.

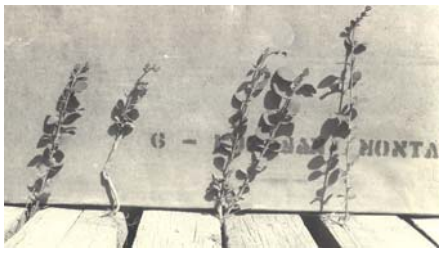




Distribution of Black Stem Rust between 1916 and 1950 in Montana

Historically

The first case of rust was reported to have occurred in Richland County in 1916. There were several reported outbreaks in 1918 "directly traceable to infected barberries." Between 1918 and 1950 there were 67 reported cases in 29 counties of rust on cereal grains. Of these cases, 17 sites in eight counties were attributed to rust on barberry.



Barberry eaten back by stock. Popham, 1928

The National Rust Busters Club, promoted by the USDA to enlist the assistance of school children, was established in 1931. Club members reported a total of 2,832 barberry plants at 36 sites from 1931 through 1936.

Barberry bushes being destroyed, Missoula, MT. L.J.B. 1949

1947 Crew in Rollins, MT

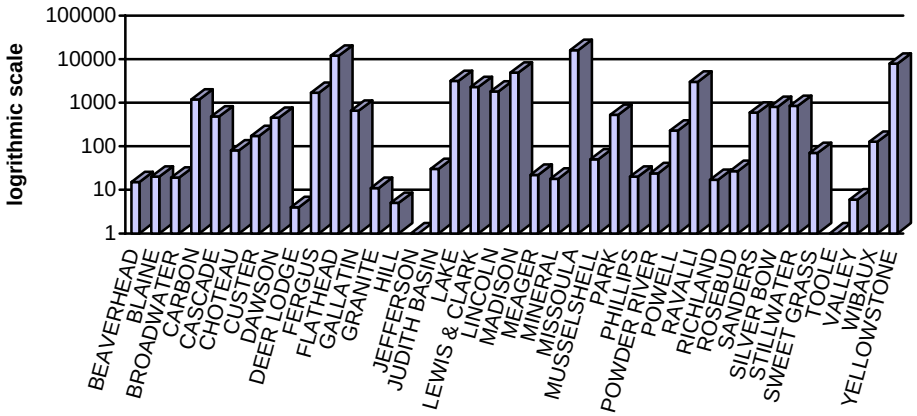
From 1918 to 1940 Missoula County was recorded as having 15,699 barberry on 46 properties, representing one third of the state total. A large hedge of barberry discovered in Ravalli County in 1934 was believed to have been there for more than 20 years. In 1938 both sides of the Yellowstone and Clark Fork rivers were surveyed with 607 bushes found on seven properties, "many of which were heavily infected and loaded with fruit." In 1940 as many as 30 men were enlisted to survey Carbon County, with additional men requisitioned. Between 1918 and 1974 a total of 153,584 square miles had been surveyed, with an estimated 59,481 barberry plants having been destroyed.

Today

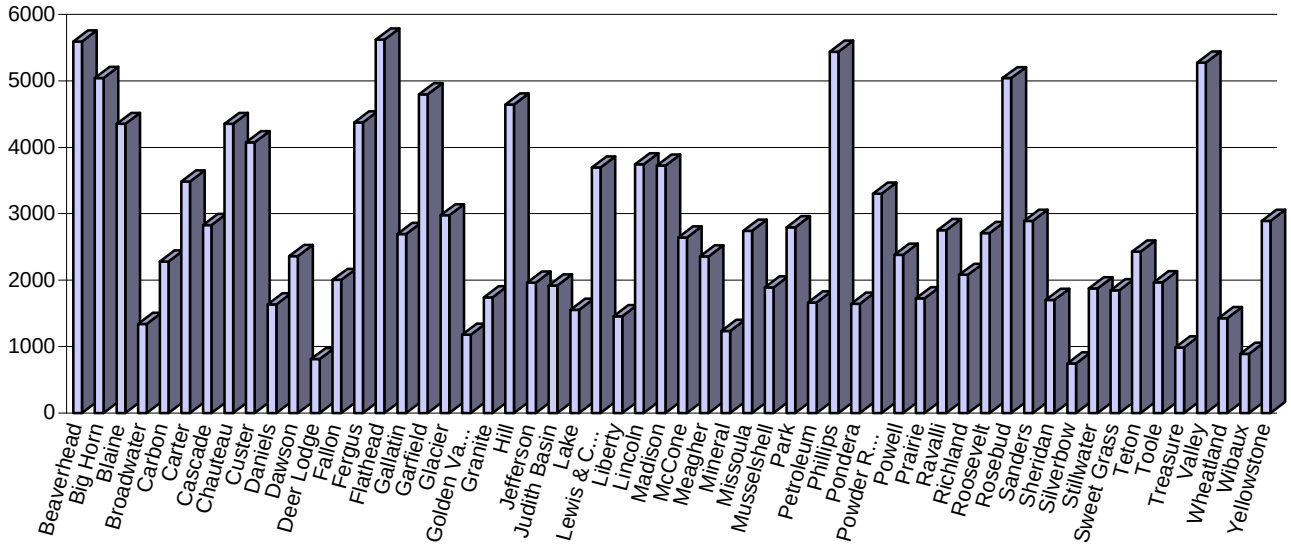
An intensive search of the historical records was conducted with a total of 74 sites chosen. If the site had tested positive for rust or had barberry as of the last survey date, it was chosen for resurvey. The properties were prioritized according to the presence of rust, followed by the number of barberry last found at the site. A total of nine barberry plants were found at one site in Lincoln County. Eight bushes were found at one site in Lewis and Clark County, one bush was found in Flathead County, and one bush in Fergus County. There were no reported cases of Black Stem Rust in cereal grains. One barberry sample was submitted to the ARS Cereal Disease Laboratory and it was determined that the sample had been infected with rust, but it could not be determined which stem rust. In 2004 the MDA will work with landowners to remove and destroy barberry plants identified in the 2003 survey.

Special thanks to Gary Adams, the USDA, APHIS, PPQ State Plant Health Director of Montana, for allowing us access to the historical records.

Total Barberry Destroyed in Montana Since 1918



Square Miles Surveyed in Montana from 1918 to 1975



Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

Cereal Leaf Beetle Survey Report
2003

Cereal Leaf Beetle Adult
Photo courtesy of NAPIS

Cereal leaf beetle (*Oulema melanopus* (L.) (CLB) is a pest of small grains. In many areas, particularly its native range (eastern Europe), the primary damage is by late instar larvae, feeding on the flag leaf, during the period of time when a majority of the kernel development occurs. However, in the United States, and particularly Montana, damage by adult beetles to emergent seedlings can also reach economic levels and require treatment. To help prevent the spread of this insect, certain crops known to harbor the adults, particularly during diapause and hibernation, are regulated with regard to movement from areas known to be infested with the beetle.

Cereal Leaf Beetle Damage

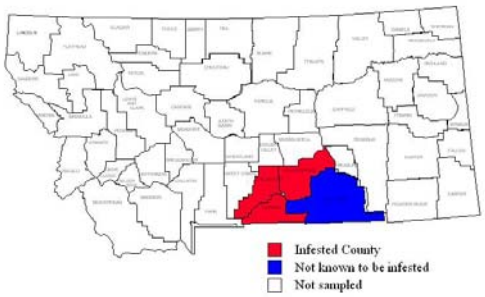
The cereal leaf beetle (CLB) was first detected in Montana in the late 1980's, in the area south and east of Billings. Surveys for adults and larvae were carried out by Montana Department of Agriculture personnel in cooperation with Montana State University personnel. Initially, 3 counties were found to be infested with this beetle: Carbon, Stillwater, and Yellowstone (Figure 1). By 1993, the beetle had spread to 10 counties, and 15 in 1995 (Figure 1). Currently, CLB has been detected in all but 12 of Montana's 56 counties, including all those west of the divide (Figure 1). However, Toole, Liberty, Glacier and Hill Counties, all important grain production areas, are not known to have established populations of CLB.

Cereal Leaf Beetle Larvae

During 2003, all counties not known to have established populations of CLB were surveyed, using sweep nets, during the early portion of the growing season, to maximize the potential for collecting either adults or larvae. CLB was detected in Pondera County in 2003. One adult CLB was caught in Glacier County, but extensive sweeps did not find additional beetles, so CLB is not known to be established in that county.

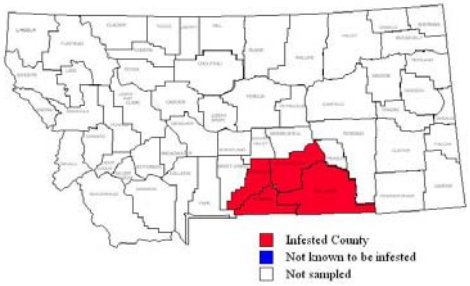
Figure 1. Spread of Cereal Leaf Beetle through Montana since 1989.

(a). 1989



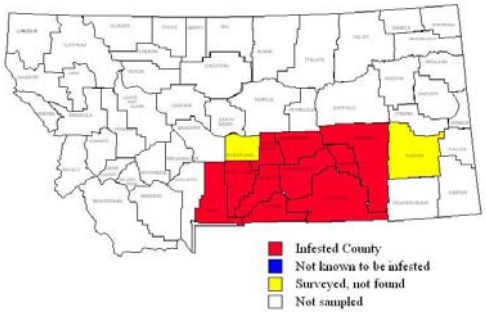
(b). 1990

(c). 1991

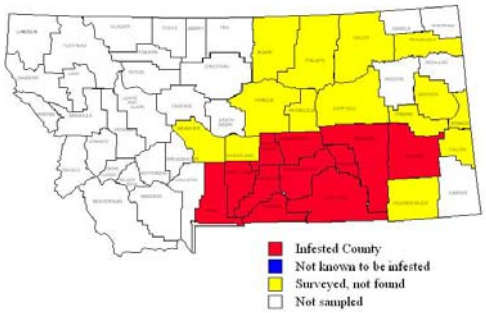


(d). 1992

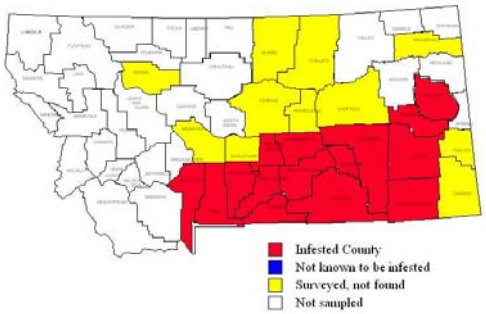
(e). 1993



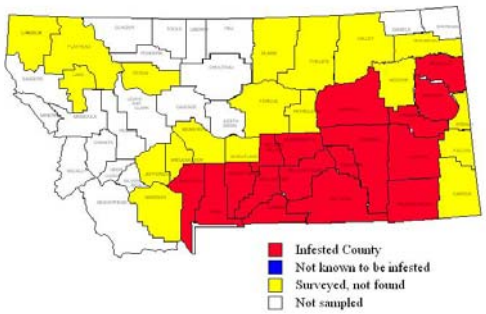
(f). 1994



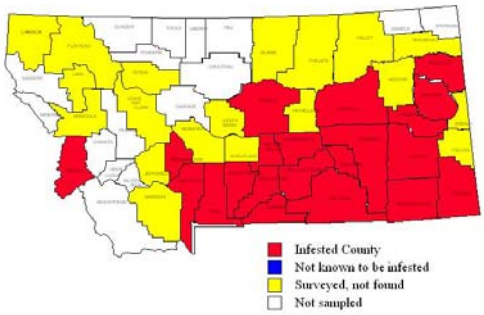
(g). 1995



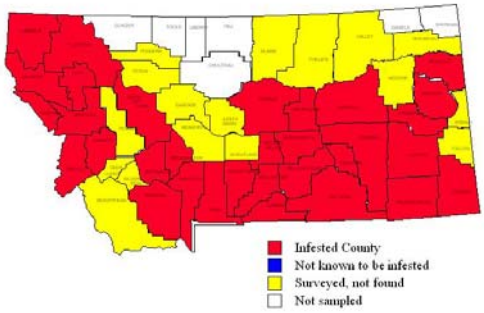
(h). 1996



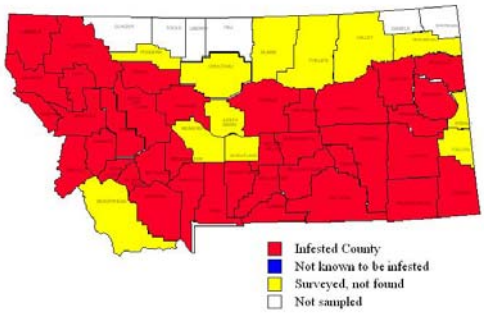
(i). 1997



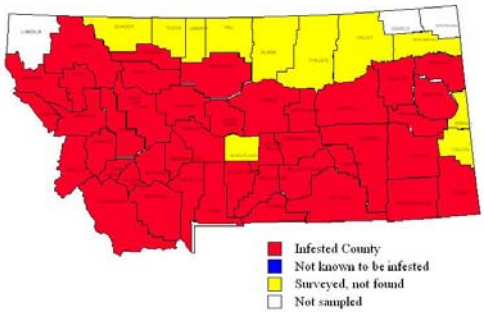
(j). 1998



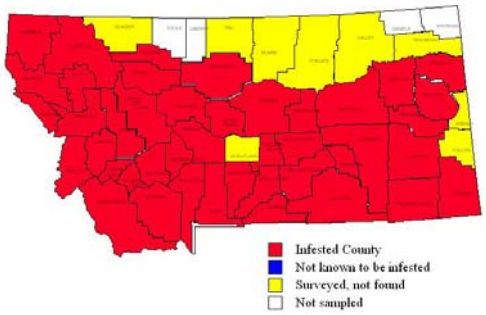
(k). 1999



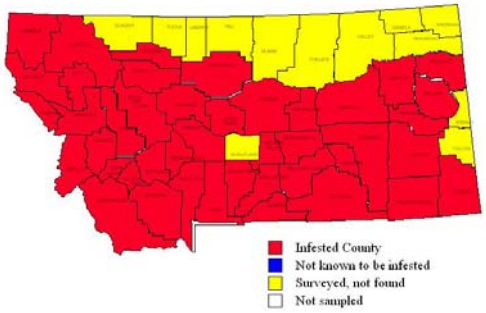
(l). 2000



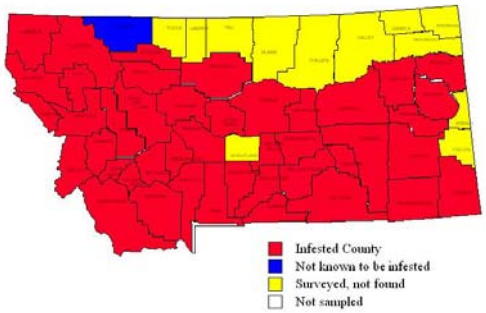
(m). 2001



(n). 2002



(o). 2003



Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

Cereal Leaf Beetle Biological Control Report
2003

The cereal leaf beetle has been a pest to grain crops in Montana for over a decade now. It has spread to more than half of the counties in Montana. It has lowered yields for our grain growers and has greatly increased their expenses for controlling this pest. As a result, positive counties are quarantined by the state of California for grains and hay, and by Canada for hay.

In order to help Montana farmers reduce the amount of dependency on insecticides to control the cereal leaf beetle, the Montana Department of Agriculture (MDA) has been involved in biological control of cereal leaf beetle for a number of years. An insectary for the egg parasite, *Anaphes flavipes*, has been maintained by APHIS PPQ in Western Montana for several years. The MDA established an insectary in Lake County for the parasitic wasp, *Tetrastichus julis* in 2002. *T. julis* has been shown to reduce the population of the cereal leaf beetle.

T. julis parasite,
photo courtesy of WSDA

The purpose of the 2003 project was to maintain Montana's current insectary located in western Montana.

In cooperation with APHIS PPQ, parasites were collected and either released or shipped to customers in neighboring states. APHIS PPQ staff conducted two training sessions with MDA staff on identifying parasitized larvae in the field. The biocontrol project has been tentatively approved to continue in 2004. The MDA plans to continue maintaining the insectary in Lake County, and to determine the distribution of *T. julis* in Montana.

Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

Golden Nematode Survey Report
2003

The golden nematode, ***Globodera rostochiensis*** (Wollenweber), is a very serious pest of potatoes. It is recognized throughout temperate regions of the world as one of the most difficult of all crop pests to control. This nematode forms cysts on the roots of potatoes, which causes drastic losses in yield. This pest has a remarkable ability to survive under unfavorable conditions and can remain dormant in the soil in the absence of host plants for many years.

This pest is only known to occur in several counties in New York and is not known to exist in Montana. A federal domestic quarantine regulates the golden nematode in the U.S. Countries not known to be infested with golden nematode have strict regulations governing the importation of potatoes. Golden nematode is considered a priority pest nationwide and is identified on the CAPS National Priority Pest List and the CAPS Western Region Pest List.

Montana's seed potato industry is a valuable component of Montana agriculture. Montana produces approximately 10,000 acres of certified seed potatoes yearly and exports them to various states and countries. A golden nematode survey in Montana's potato growing regions was necessary in order to facilitate Montana potato exports. Many countries, like Mexico and Taiwan, have strict requirements regarding nematode pests. Requirements can range from soil surveys that show pest-free areas to requiring treatment of commodities. Soil samples were also analyzed for other nematodes of quarantine concern.

Year	Acreage		Yield Per Acre Cwt.	Pro-duction (000) Cwt.	Total used for Seed (000) Cwt.	Farm Disposition			Price Per Cwt. $	Value		
						Where grown		Sold (000) Cwt.				
	Planted (000) Acres	Har-vested (000) Acres				Seed, Feed, & Home 1/ (000) Cwt.	Shrink & Loss 2/ (000) Cwt.			Of Production (000) Dollars	Per Acre Dollars	Of Sales (000) Dollars
2001	10.5	10.3	320	3,296	263	152	188	2,956	9.15	30,158	2,928	27,047

Last updated November 12, 2003

The Montana Department of Agriculture (MDA) collected approximately 80 soil samples during the fall harvest 2002, in Flathead, Powell, Deer Lodge, Jefferson, Beaverhead, Madison, Gallatin, Liberty, Choteau, and Blaine counties. Essentially, Montana has six potato growing regions: Kalispell, Pablo, Deer Lodge, Dillon, Manhattan, and the North Central region. All 6 regions were represented in this survey. The sample collection sites and numbers were determined by utilizing the amount of seed potatoes shipped in 2001, which also corresponds with the number of acres each grower planted.

Sixty samples were collected from piles of soil that accumulate under the conveyor belts during sorting. This collection method allowed for a representative sample of soil directly off of the seed potatoes. In addition, twenty soil samples were collected directly from the potato fields. GPS data was gathered for each sample, based on the specific field the potatoes were grown in. Inspectors gathered background information from the grower about field history. Samples were sent for analysis to the Nematode Diagnostic Laboratory at the University of Idaho.

Top 15 Regulated Nematodes*

Nematode species	Number of countries regulating in 2000
Globodera rostochiensis	106
Aphelenchoides besseyi	70
Ditylenchus dipsaci	58
Radolpholus similis	55
Globodera pallida	55
Ditylenchus destructor	53
Heterodera glycines	52
Aphelenchoides fragariae	47
Bursaphelenchus xylophilus	46
Xiphenema index	42
Nacobbus aberrans	38
Xiphinema americanum	30
Anguina tritici	24
Heterodera schachtii	22
Bursaphelenchus cocophilus	21

***Nematodes regulated by twenty or more countries in international quarantine legislation in 2000 distributed**

By Paul Lehman 2002

Nematodes of Export Certification Concern for Montana

1. Columbia Root Knot Nematode (*Meloidogyne chitwoodi*)

The CRKN is a pest that has established populations in WA, OR, ID, CA, and NM. This pest decreases the quality of tubers by causing brown spots on the surface, rendering tubers unacceptable for either processing or fresh market sale. The MDA surveyed for this pest in 2000 and had negative results. In 2002 three samples detected CRKN. Additional soil samples were taken from the field or cellar and sent to the lab for confirmation. These samples were confirmed to be Northern Root Knot Nematode,

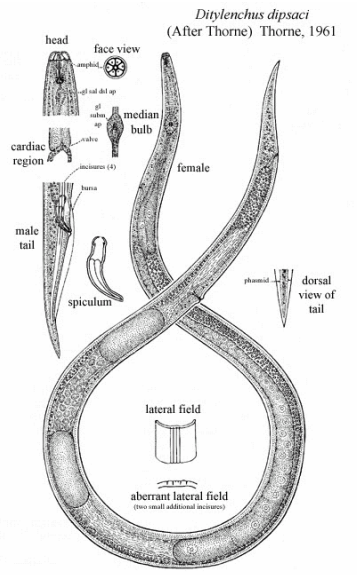
(*Meloidogyne hapla*), not CRKN.

Countries with quarantine restrictions: Mexico, Canada

2. Golden Nematode (*Globodera rostochiensis)*
   The golden nematode is known to occur in the US only on Long Island and in 3 NY counties. This pest, and *G. pallida*, are said to be the most important nematode threat to potato production. This pest causes high yield losses due to the cysts that form on the roots. The MDA surveyed for this pest in 2000 and 2002 with all negative results.
   Countries with quarantine restrictions: Mexico, Canada, and Taiwan

3. Burrowing Nematode (*Radolpholus similis*)
   The burrowing nematode is a pest of tropical and subtropical regions of the world. In the U.S. it is known to occur in Florida, Hawaii, two counties in Texas, and the commonwealth of Puerto Rico. It affects citrus fruits and bananas. The MDA surveyed for this pest in 2000 and 2002 with all negative results.

   Countries with quarantine restrictions: Taiwan

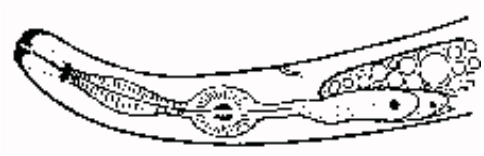


4. Stem and Bulb Nematode (*Ditylenchus dipsaci*)
   The stem and bulb nematode occurs in temperate climates and in North and South America. It attacks foliage and injures tubers. Affected stems are stunted and often turn yellow. The MDA surveyed for this pest in 2000 and 2002 with all negative results.

   Countries with quarantine restrictions: Taiwan

5. Potato Rot Nematode (Ditylenchus destructor)
   The rot nematode has scattered and infrequent distribution in the US in ID, CA, and WI. Symptoms are primarily on tubers and stolons and tuber decay and rotting is usually unnoticed until potatoes are placed in storage. The MDA surveyed for this pest in 2000 and 2002 with all negative results.

   Countries with quarantine restrictions: Taiwan

This detection survey  has shown that Montana's potato growing areas continue to be free of not only golden nematode but also other regulated nematode species, allowing potato growers to continue exports unimpeded.

Montana Department of Agricutlure
Cooperative Agricultural Pest Survey Program

Potato Mop Top Virus Survey Report
2003

In July of 2002 Potato Mop Top Virus (PMTV) was detected by the Maine Department of Agriculture at a research plot in Aroostook County, Maine. Shortly after, USDA APHIS PPQ learned that beginning in January of 2001 the Canadian Food Inspection Agency had conducted tests on US origin potatoes sampled at their border crossing representing approximately 2500 lots. These lots came from 10 states including California, Delaware, Florida, Idaho, Maine, Maryland, North Carolina, Oregon, Virginia, and Washington. Montana did not have any lots that tested positive for PMTV.

Measures were taken by the Maine Department of Agriculture in conjunction with APHIS to contain any infected lots and plow down the seed plot from which the infected lots are believed to have originated. Investigations were initiated to trace the origins and destinations of seed potatoes from Maine and the sources of seed potatoes for plantings in states from which infected lots originated.

Photo courtesy of University of Maine Extension Service

PMTV is a soil-borne virus. The disease may cause discoloration or necrotic rings on lines in infected tubers. Above ground portions of infected plants may show various types of mottling and stunting. Losses of up to 20 percent have been reported in sensitive cultivars as a result of reduced tuber production and loss of tuber quality. The vector for PMTV is the fungus that causes powdery scab disease in potatoes (*Spongospora subterranea* f. sp. *subterranea*) - a pathogen that is present in many areas where potatoes are grown. Spread of the disease occurs as a result of the movement of virus-infected tubers moved with the scab fungus, or by the movement of soil contaminated with fungus spores containing the virus. Aphids or other insects do not spread PMTV, so the natural spread of the disease is extremely slow.

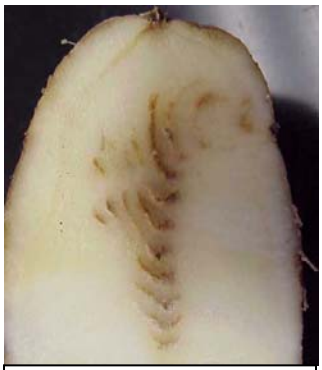


Photo courtesy of University of Maine

In cooperation with the Montana Potato Improvement Association and Montana State University Seed Potato Certification Program, 3,596 tubers were collected and tested by the MSU potato lab for potato mop top virus in October of 2002. Fifty-six growers were represented and 600 lots of potatoes were tested. All tests were negative for potato mop top virus. Counties represented in the tests were Beaverhead, Blaine, Broadwater, Chouteau, Deer Lodge, Flathead, Gallatin, Lake, Liberty, Madison, and Powell.